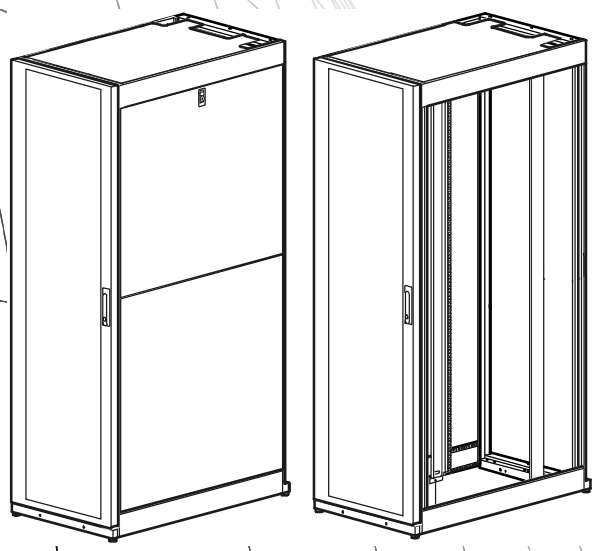
APC
by Schneider Electric

Unpacking, Installation, and Customization

NetShelter® VL Enclosure

AR2900
AR2901



ns1480a

This manual is available in English on the APC Web site (www.apc.com).

APC 웹싸이트 (www.apc.com) 에 한국어 매뉴얼 있습니다 .

在 APC 公司的网站上 (www.apc.com) 有本手册的中文版。

您可以從 APC 網址 (www.apc.com) 上瀏覽下載本手冊的中文版本。

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Product Overview

Description

The APC by Schneider Electric NetShelter® VL 600-mm wide enclosures are high-quality enclosures for storage of industry-standard (EIA-310), 19-inch rack-mount hardware, which includes servers and voice, data, networking, internetworking, and APC power protection equipment.

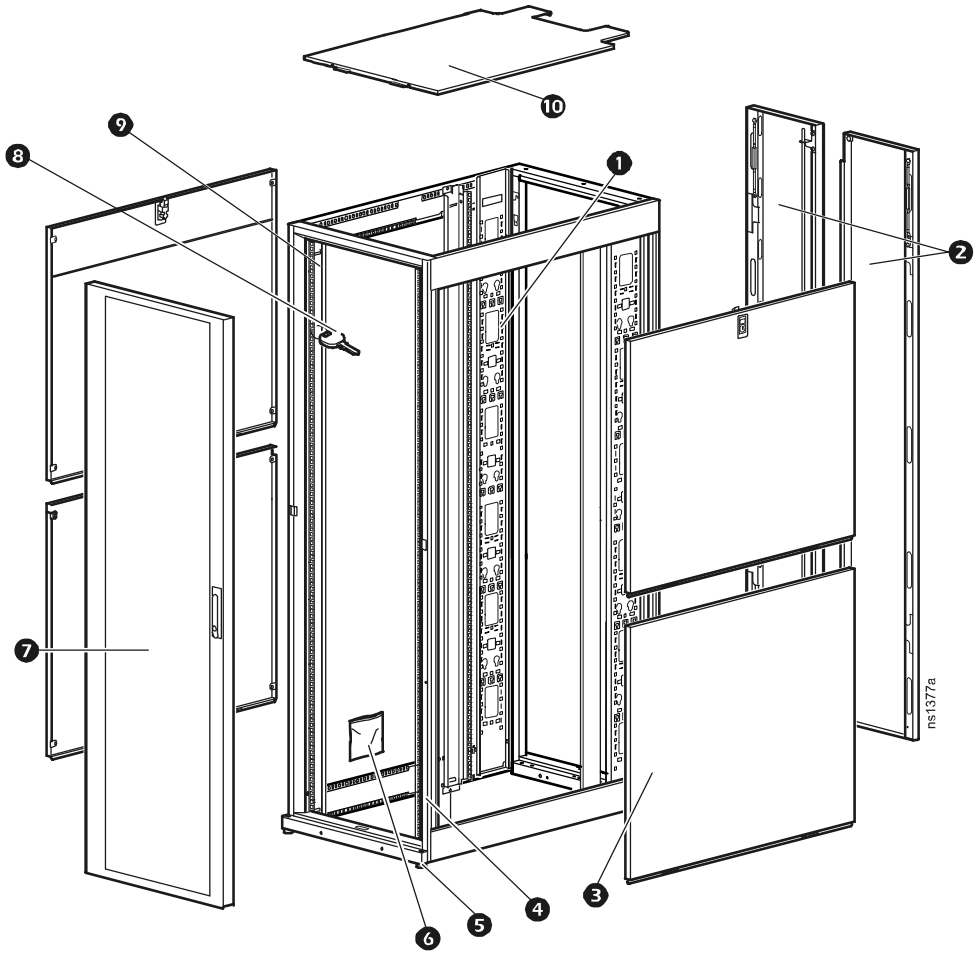
NetShelter VL Enclosures

Model	Description	Rack Mounting Height	Rack Mounting Width	External Enclosure Width	Enclosure Depth
AR2900	Enclosure with sides	42 U†	482 mm (19 in)	600 mm (23.62 in)	1070 mm (42.13 in)
AR2901	Enclosure without sides	42 U	482 mm (19 in)	600 mm (23.62 in)	1070 mm (42.13 in)

†One U= 44.45 mm (1.75 in). See “Identifying one U-space on the vertical mounting flange” on page 20.

Product Inventory

Components of the enclosure



❶	AR7501 Rear Cable Channel (not provided)	❻	Hardware bag
❷	Split doors	❼	Reversible door
❸	AR7302 Side panels (AR2900 only)	❽	Key
❹	Frame posts	❾	Vertical mounting flanges
❺	Adjustable leveling feet	❿	Roof

Before Installation

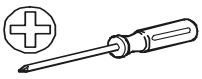
Tools

Tools (provided)

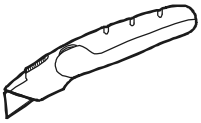
Torx® T30/#2 Phillips wrench (1)

Cage nut tool (1)

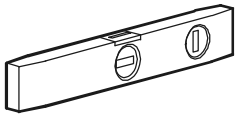
Other tools required (not provided)



Phillips screwdriver

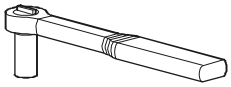


Utility knife



Level

13-mm open-ended wrench



10-mm socket wrench

Unpacking

Unpacking the enclosure

Heavy: Use at least two people to unpack the enclosure.

Warning: To prevent the enclosure from tipping over after installation:

- **Stabilize the enclosure before installing the components.** See "Rack stabilization options" on page 9.
- **Do not extend components on sliding rails out from the enclosure until you have installed three or more pieces of similar equipment, or the stabilizer plate or bolt-down brackets are installed.** See "Rack stabilization options" on page 9.
- Do not extend more than one component from the enclosure at a time.
- Load the heaviest components first, and place them toward the bottom of the enclosure to prevent the enclosure from becoming top-heavy.
- Use caution when moving an empty enclosure on its casters (not provided); the enclosure may be unstable when pushed or pulled from the side. Push the enclosure from the front or back when moving it on its casters. For extra stability, load 159 kg (350 lb) of equipment into the bottom of the enclosure before moving it on its casters.

1. Move the shipping pallet to a firm, level surface in an open area. Inspect the enclosure for visible signs of shipping damage. If you detect shipping damage, contact APC Customer Support at the number listed on the yellow label on the front of the enclosure or on the APC Web site, **www.apc.com**.
2. See the label on the packaging to determine where to cut the wrapping. Using sturdy shears or a utility knife, carefully remove the plastic stretch wrap surrounding the enclosure.

Note: Save the bag containing the warranty card and installation manual.

3. Remove the four cardboard corner protectors.
4. Remove the two pallet-mounting brackets that anchor the enclosure to the shipping pallet, using a 13-mm wrench (not provided).

Note: Save the pallet-mounting brackets if you plan to bolt the enclosure to the floor. See "Rack stabilization options" on page 9.

5. With one person on each side of the enclosure, carefully lift it toward the rear of the pallet until the rear frame of the enclosure clears the back edge of the pallet. Continue to slide the enclosure rearward until the rear frame touches the floor.
6. While one person carefully tips the enclosure slightly away from the pallet, have the other person pull the pallet away from the enclosure. Set the enclosure gently on the floor.

   Note: Save the pallet if you plan to reship the enclosure.

7. If you are not using a rack stabilization option, use the 7-mm hole plugs (provided) to cover the holes used to attach the pallet-mounting bracket to the frame.

Please recycle

The shipping materials are recyclable. Save them for later use, or dispose of them appropriately.

Disclaimer

APC is not responsible for damage sustained during reshipment of this product.

Verify the inventory

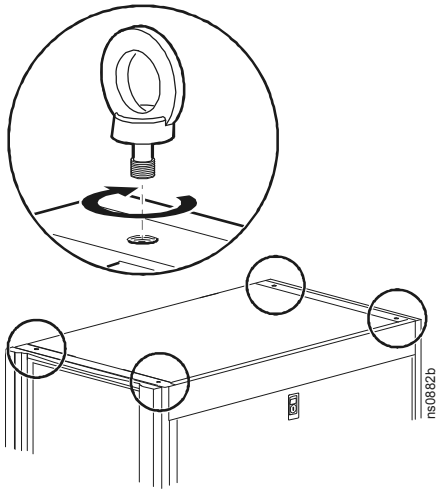
After unpacking the enclosure, verify that all required components and hardware have been shipped with the enclosure. See “Product Inventory” on page 2 for a list of components.

Note: If any items are missing, contact APC Customer Support at the APC Web site, **www.apc.com**.

Moving the enclosure

Casters (not provided). The enclosure can be moved on its casters (not provided) with up to 800 kg (1,763 lb) of equipment installed. Push the enclosure from the front or the back, not the sides; it may be unstable when pushed from the side. For greater stability, load 159 kg (350 lb) or more of equipment into the enclosure before moving it on its casters.

Eye bolts. If lifting of the enclosure is necessary, this can be done by attaching eye bolts (not included) to the top of the enclosure frame. Use appropriately rated M10 eye bolts with a shoulder for angular lifting. The maximum weight of installed equipment should be 142 kg (312 lb) per eye bolt (567 kg [1,250 lb] total).



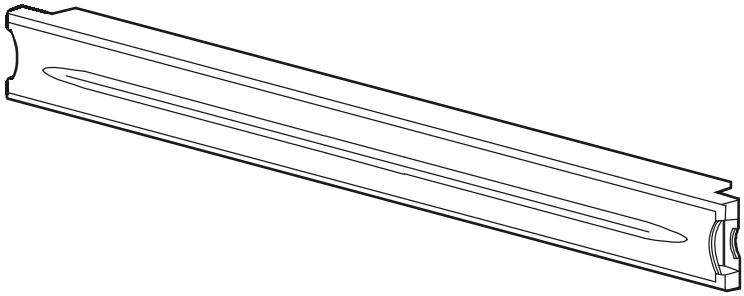
Configuration

Before installing the enclosure, plan the location and space needed to install equipment, and plan the ergonomics of keyboards and video monitors.

The Rack Configurator, available on the APC Web site, **www.apc.com**, helps you plan your configuration to maximize the available U-space of your enclosures.

Caution: Improper airflow could damage installed components.

To maintain proper airflow, cover any empty vertical enclosure space with blanking panels (not included). APC offers modular, plastic Airflow Management Blanking Panels that snap into place without tools (AR8136BLK).



Installation

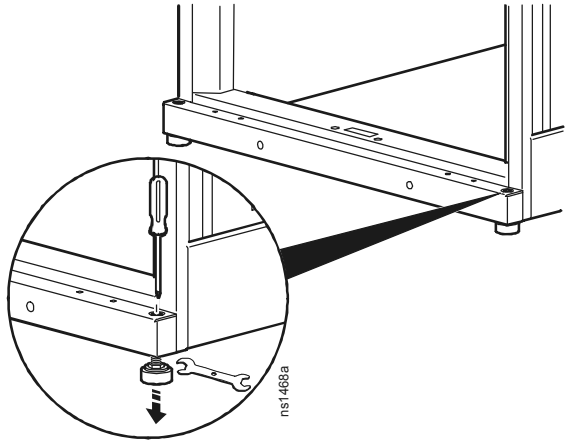
Installing the Enclosure

Leveling the enclosure

Level the enclosure before installing equipment.

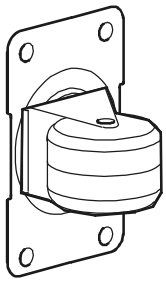
The leveling feet at the corners provide a stable base if the floor is uneven, but they cannot compensate for a badly sloped surface. You can remove the casters (not provided) and leveling feet to allow the base of the enclosure to rest directly on the floor.

1. Move the enclosure to a level location.
2. For each leveling foot, insert a Phillips or slotted screwdriver (not provided) into the screw above the leveling foot. Turn the screw clockwise to extend the leveling foot until it makes firm contact with the floor.



Note: If the enclosure needs to be leveled after equipment has been installed, use a 13-mm open-ended wrench (not provided) to lower the leveling feet. For each leveling foot, fit the 13-mm end of the open-ended wrench to the hex head just above the round pad on the bottom of the foot. Turn the wrench clockwise to extend the leveling foot until it makes firm contact with the floor.

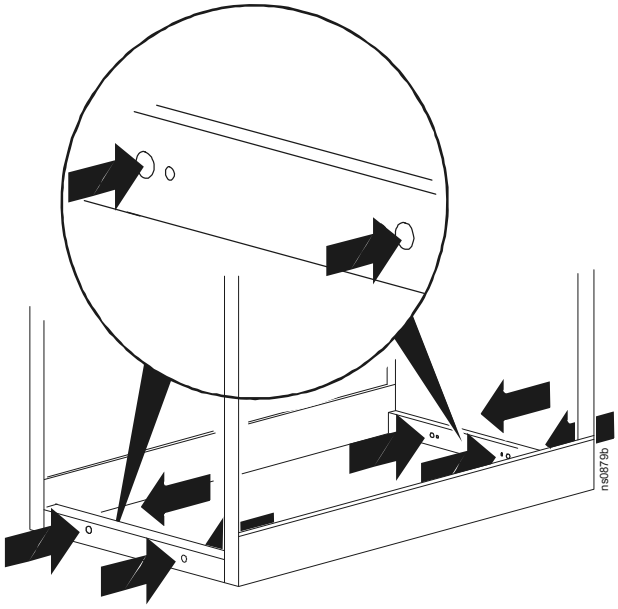
APC offers the following options for leveling the enclosure.

Product	SKU	Description	Figure
Caster kit	AR7719	Attaches externally to the enclosure to provide additional stability and mobility.	

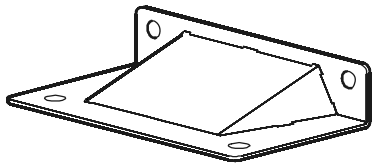
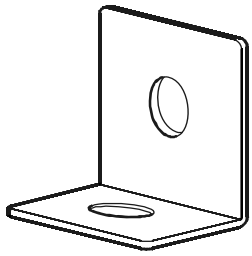
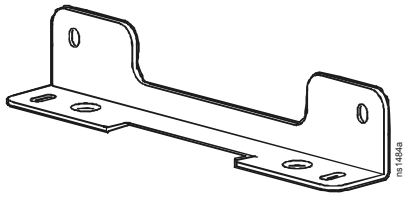
Rack stabilization options

Warning: The enclosure cannot be stabilized using the bolt-down bracket or stabilization plate if the casters or leveling feet are removed.

Brackets can be used to bolt the enclosure to the floor internally or externally for additional stabilization. With the appropriate anchoring hardware (not provided), this system meets UBC Zone 4 requirements. See the APC Web site, **www.apc.com**, for complete UBC compliance requirements and bracket installation instructions. All brackets can be fastened to the enclosure through the holes shown in the following illustration.



APC offers the following brackets for providing stabilization.

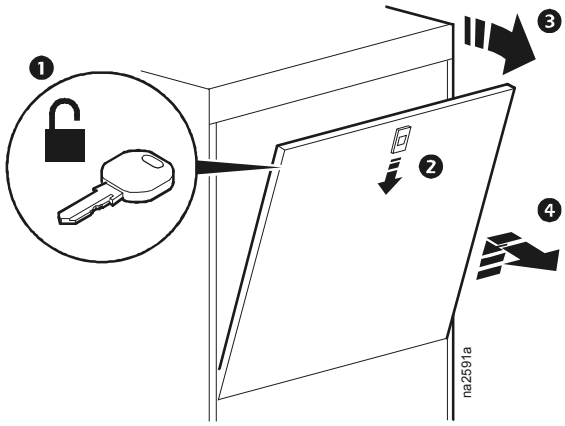
Product	SKU	Description	Figure
Stabilizer Plate Kit	AR7700	Attaches externally to the rack and floor to provide additional stability. The leveling feet must be fully extended or casters (not provided) attached to use.	
Bolt-down Kit	AR7701	Attaches to the rack and floor internally or externally to provide additional stability without blocking cable access. The leveling feet must be fully extended or casters (not provided) attached to use.	
Pallet Mounting Bracket (provided)		Attaches to the rack and floor internally or externally to provide additional stability.	

Removing and Installing the Side Panels

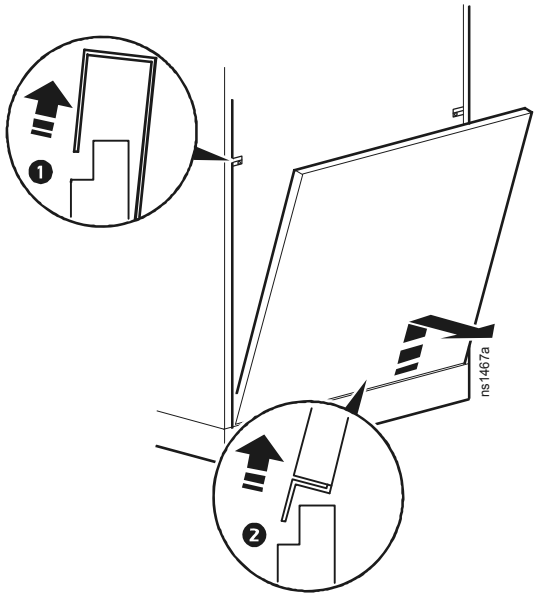
Remove the side panels to access the interior or pass cables between the enclosures when joining enclosures together. Side panels offer additional security and assist with proper airflow within the enclosure.

Removing the side panels

1. Use the key ❶ to unlock the upper side panel, if necessary.
2. Slide the panel latch ❷ down and pull the top of the panel away from the enclosure .
3. Release the latch and lift the panel up and off the side panel flange on the enclosure frame.

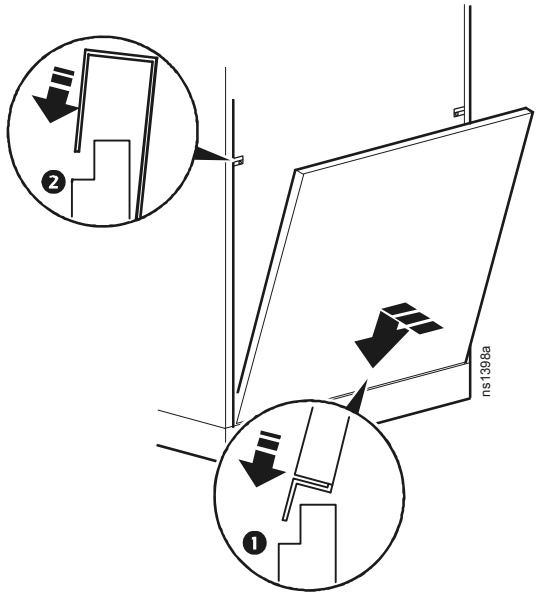


4. Lift the lower side panel up and off the side panel flange ❶ and lower lip ❷ at the bottom of the enclosure frame.

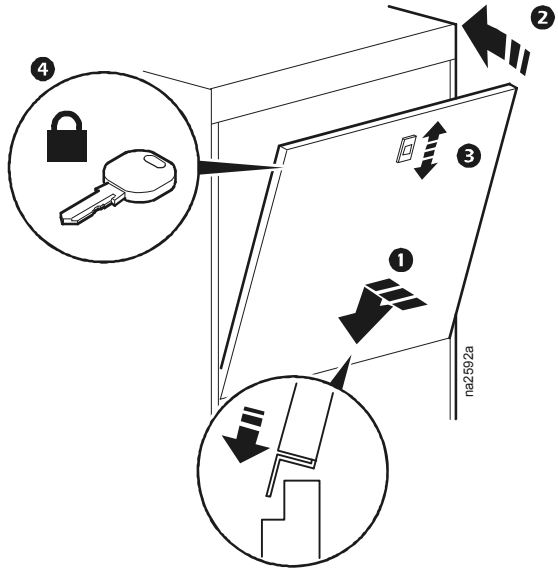


Reinstalling the side panels

1. Engage the lower side panel securely with lower lip ❶ at the bottom of the enclosure frame.
2. Lift the top of the side panel onto the side panel flange ❷ on the enclosure frame.



3. Engage the bottom of the upper side panel securely with the side panel flange before pushing the top of the panel forward into place.
4. Slide the panel latch ❸ up.



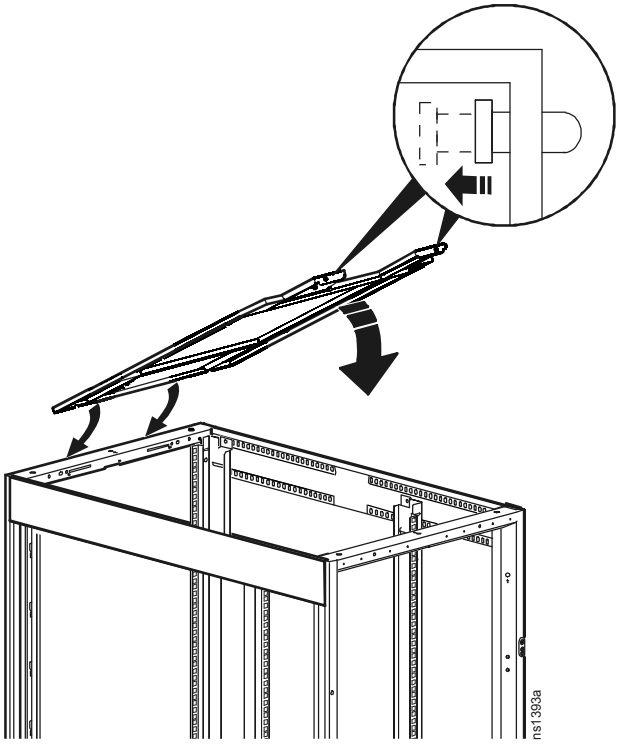
Removing and Installing the Roof

Removing the roof

1. Pull and hold the two spring pins in the rear of the enclosure.
2. Push the roof up from the enclosure.
3. Lift the roof off the enclosure.

Installing the roof

1. Slide the tabs on the front of the roof into the slots in the front of the enclosure.
2. Lower the roof into the enclosure, while pulling the two spring pins in the rear of the roof.
3. Release the pins to secure the roof to the enclosure.



Warning: To avoid damage or injury, do not use the roof as a walkway.

Note: The roof can be removed and reinstalled even if cables are routed through the top of the enclosure.

Removing and Installing the Doors

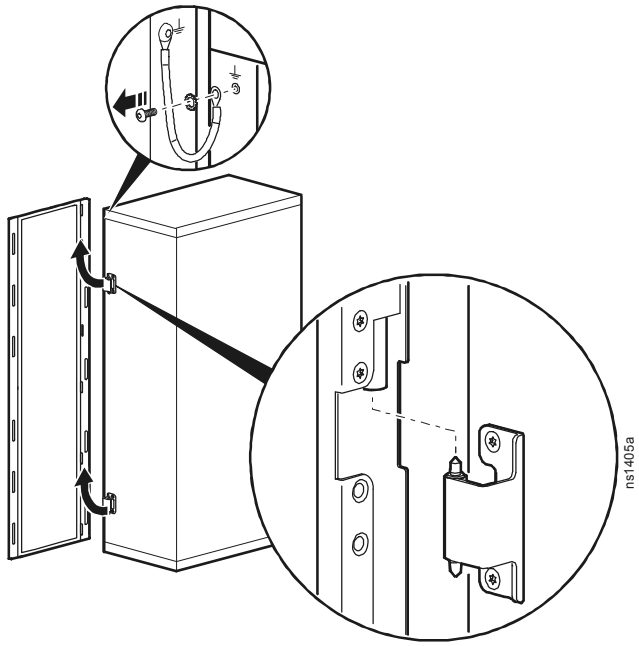
Note: If the enclosures are joined together, see “Removing the Doors of Joined Enclosures” on page 27.

Warning: To avoid personal injury or damage to the enclosure, one person should support the door while another person removes the door from its frame.

Removing the doors

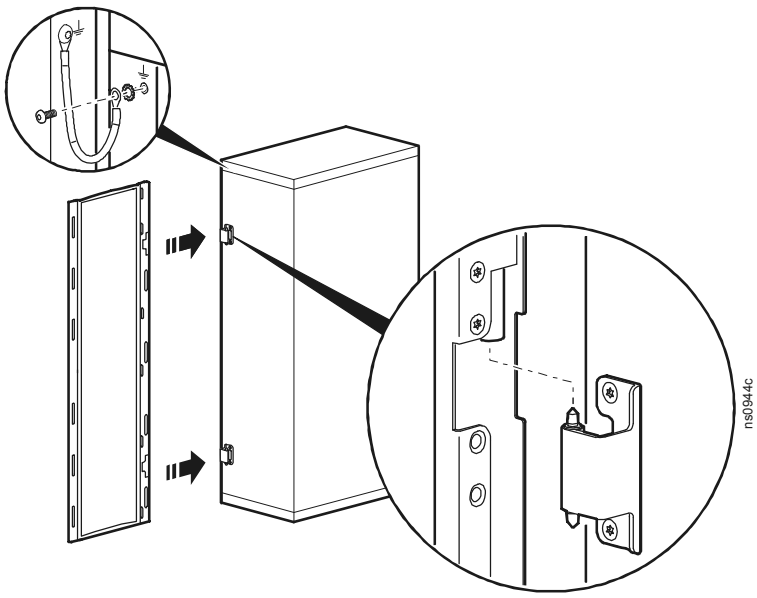
You can remove the front and rear doors of the enclosure to gain better access to equipment.

1. Disconnect the grounding wire by removing the M6 x 12 pan-head screws and star washers that secure the grounding wire to the frame and door, using the Torx T30/#2 Phillips wrench (provided).
2. Open the door to approximately 90 degrees and lift it up and off the hinges.



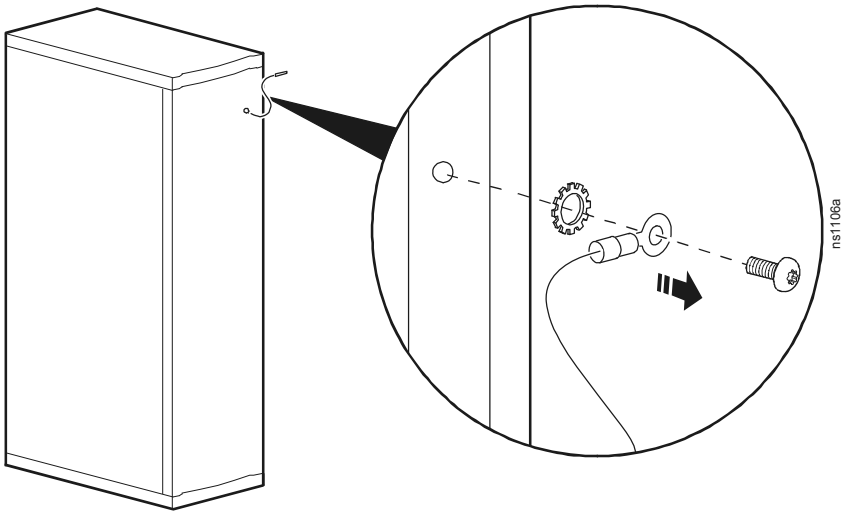
Installing the doors

1. Hold the door approximately 90 degrees to the frame of the enclosure. Align the door hinges with the hinge pins on the frame.
2. Lower the door onto the hinge pins, making sure the pins engage with the hinge barrels on the door.
3. Reconnect the grounding wire.
4. Make sure that the door opens and closes properly.

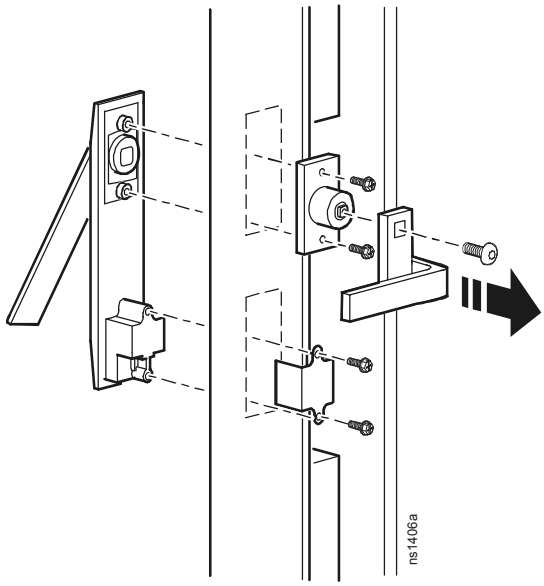


Reversing the front door

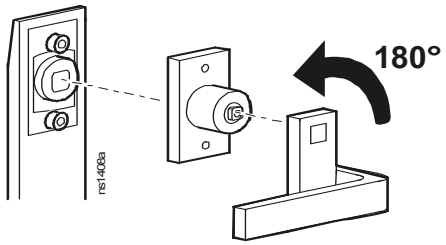
1. Disconnect the grounding wire.



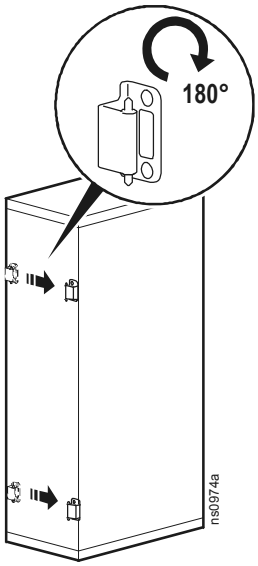
2. Remove the handle assembly from the door.



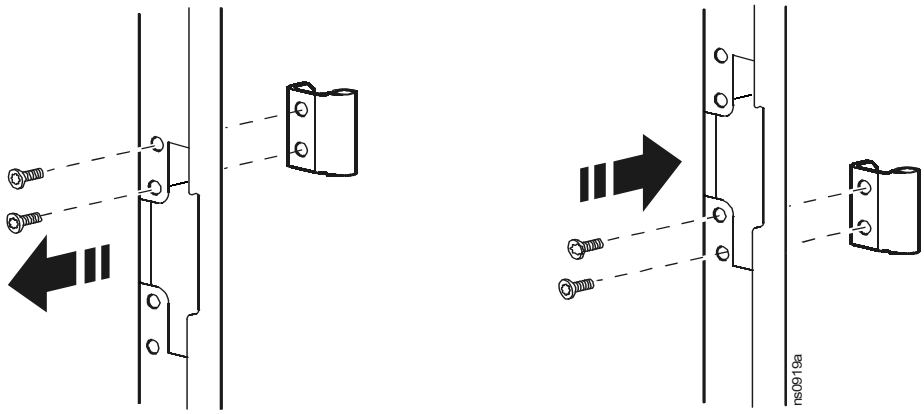
3. Remove the screw, latch, and washer from the back of the door handle assembly using the Torx T30/#2 Phillips wrench (provided). Rotate the latch 180 degrees and reattach the latch.



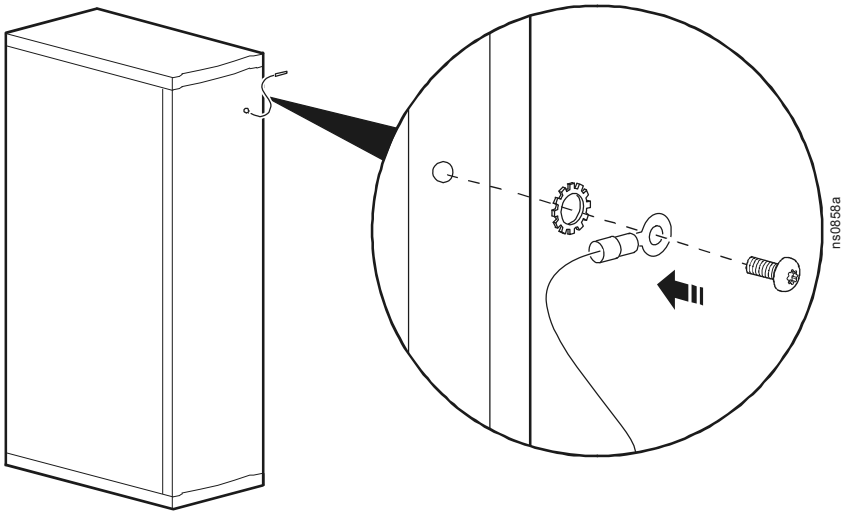
4. Remove the door. See “Removing the doors” on page 13.
5. Remove the hinges from the frame using the Torx T30 /#2 Phillips wrench (provided). Rotate the hinges 180 degrees, and reinstall them on the other side of the frame of the enclosure.



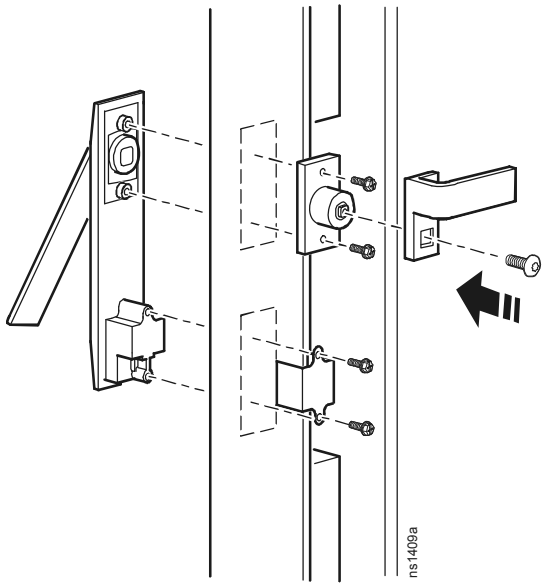
6. Remove the hinges from the door and reinstall them using the set of holes directly below where they were originally installed.



7. Rotate the door 180 degrees and reinstall the door. See “Installing the doors” on page 13.
8. Reinstall the grounding wire at the top of the door, near the hinges, and to the enclosure frame using the M6 x 12 pan-head screw and star washer.

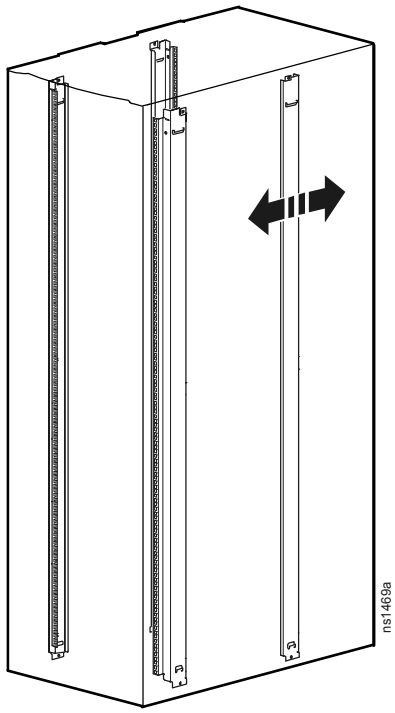


9. Rotate the door handle assembly 180 degrees and reinstall it using the screws removed in step 2.



Vertical Mounting Flanges

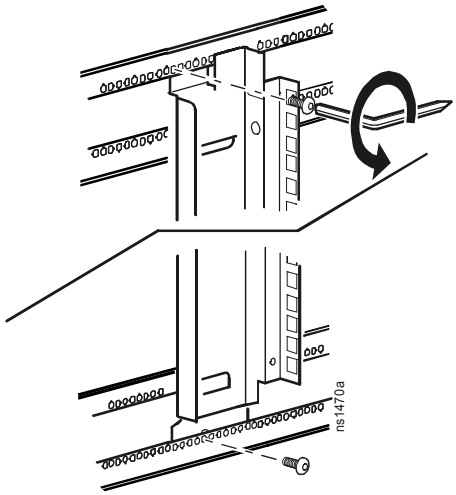
Vertical mounting flanges come factory-installed on the enclosure in the proper position for use with rack-mountable equipment that has a depth of 737 mm (29 in). The mounting flanges are adjustable towards the front or the rear of the enclosure to accommodate different rails or equipment with other depths. The flanges on a 600-mm enclosure can be adjusted to be as close as 191 mm (7.50 in) or as far as 935 mm (36.80 in) apart.



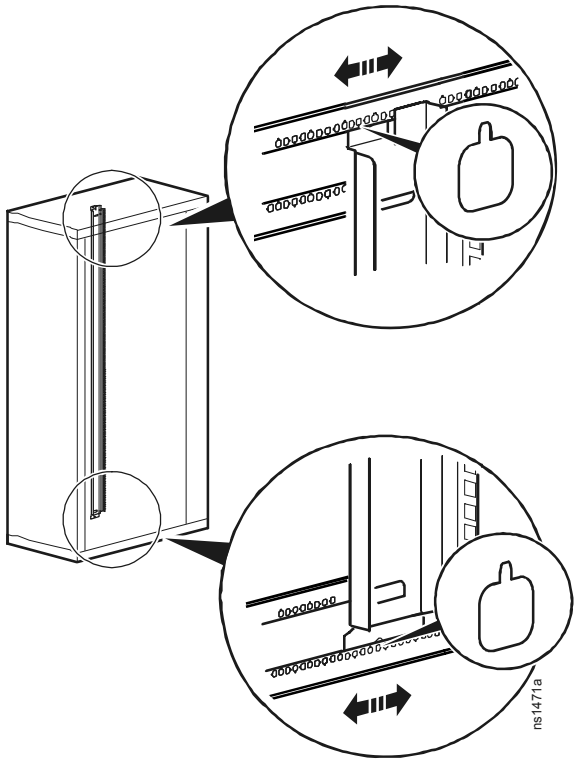
Adjusting the vertical mounting flanges on the side braces

Warning: To avoid personal injury or damage to the enclosure, perform this procedure without any equipment installed on the mounting flanges.

1. Use the Torx T30/#2 Phillips wrench (provided) to remove the Torx screws in the slots of each mounting flange.



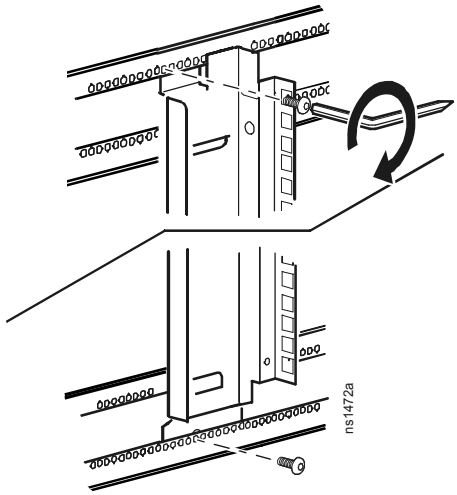
2. To align the vertical mounting flanges properly, note the symbol visible through the hole on the top of the flange, and ensure that the same symbol is visible through the corresponding hole at the bottom of the flange. Only one symbol is visible at a time through the hole. In the factory-standard position, the circles are visible through two of the holes.



Note: Vertical mounting flanges adjust in 12.7-mm (1/2-in) increments.

Note: Vertical mounting flanges placed across from each other must have the same visible symbol.

3. When the vertical mounting flange is in the proper location, re-install and tighten the Torx screws.

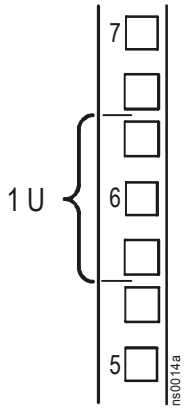


Installing Equipment

This section provides information on how to install rack-mount equipment in the NetShelter VL enclosure. The instructions provided with the equipment provide more detailed information.

Identifying one U-space on the vertical mounting flange

When installing equipment, locate the top and bottom of a U-space on the mounting flanges. Every third hole on the mounting flanges of a NetShelter enclosure is numbered to indicate the middle of a U-space. A U-space consists of one of these numbered holes and one hole directly above and below it, as shown.



Installing cage nuts

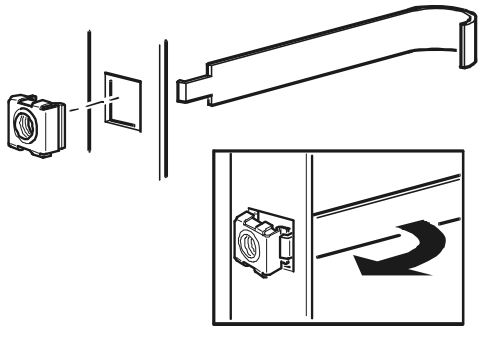
APC offers a cage nut hardware kit (AR8100) for use with square holes.

Warning: Install cage nuts horizontally, with the ears engaging the sides of the square hole. Do NOT install cage nuts vertically with the ears engaging the top and bottom of the square hole.

1. Insert the cage nut into the square hole by hooking one ear of the cage nut assembly through the far side of the hole.

   Note: Install the cage nuts on the interior of the vertical mounting flange.

2. Place the cage nut tool (provided) on the other side of the cage nut and pull to snap it into position.



Removing cage nuts

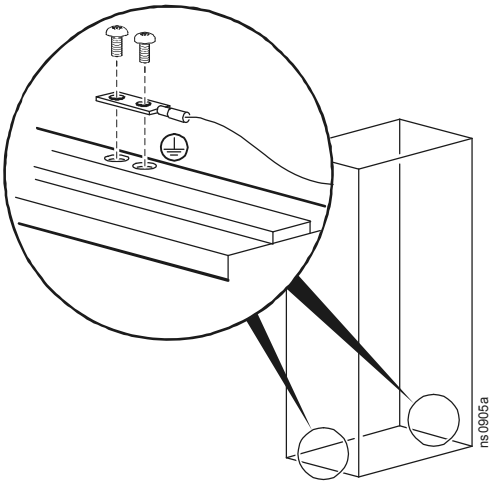
1. Remove any attached screw.
2. Grasp the cage nut and squeeze the sides to release it from the square hole.

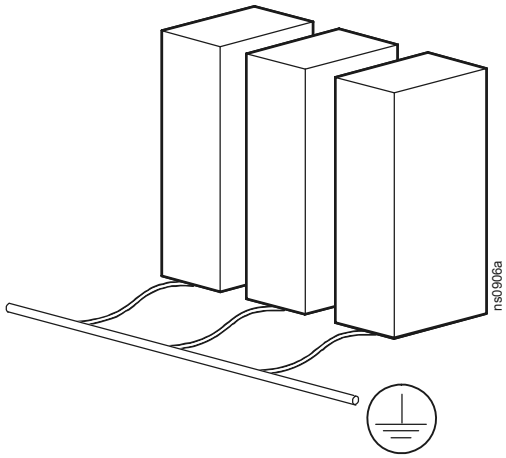
Grounding

The doors, side panels, and roof of the enclosure are grounded to the enclosure frame. The doors are grounded with grounding wires. The roof and side panels are inherently grounded through spring fingers.

Each enclosure should be grounded directly to the building ground using one of the grounding nuts at the base of the enclosure.

Ground each enclosure directly to the building ground. Do not ground one enclosure to another enclosure in a cascading style.





Cable Management

The NetShelter VL enclosure has multiple cable access openings, including the roof, sides, and bottom. Rear cable channels are available for purchase with this enclosure, and APC offers a variety of other cable management accessories.

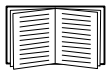
Rear cable channels (AR7501, not provided)

The rear cable channels attach to the enclosure anywhere along the side braces and provide toolless mounting capabilities for APC Rack Power Distribution Units, APC cable containment brackets, and tie-off locations for cables. The standard position for the rear cable channels are in the rear of the enclosure, but they can be mounted anywhere along the side braces in a similar manner as the mounting flanges.

Removing or relocating rear cable channels.

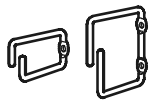
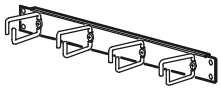
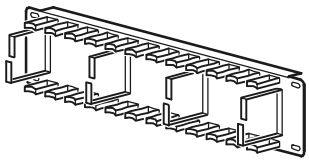
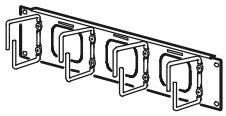
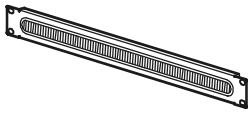
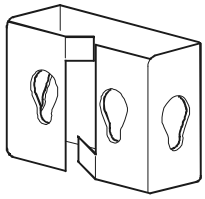
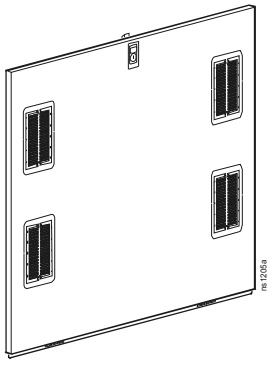
Rear cable channels can be relocated within the enclosure or removed completely.

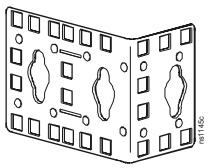
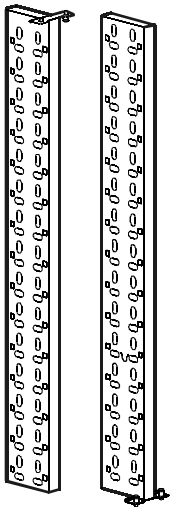
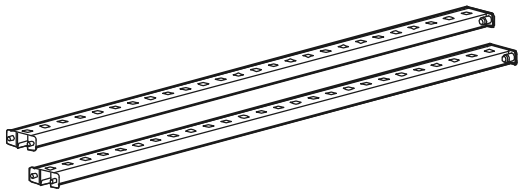
1. Loosen the screws that attach the rear cable channel to the enclosure.
2. Move the rear cable channel to the desired location or lift it up and pull it toward the inside of the enclosure.
3. Align the rear cable channel properly. The rear cable channels align in the same way as the vertical mounting flanges. See “Adjusting the vertical mounting flanges on the side braces” on page 18.



See the NetShelter VL Enclosure Rear Cable Channel (AR7501) Installation sheet provided with the rear cable channel for installation and operation instructions.

Cable management options

Product	SKU	Description	Figure
Cable management rings	AR8113A	Fastens cables to posts, mounting rails, or braces.	
19-inch horizontal cable organizer	AR8425A (1U) AR8426A (2U)	Routes cables horizontally on the front or back of the 19-inch EIA rack.	
19-inch 2-U patch cord organizer	AR8427A	Routes cables horizontally on the front or back of the 19-inch EIA rack.	
19-inch 2-U horizontal cable organizer pass-through	AR8428	Routes cables horizontally or front-to-rear.	
19-inch 1-U cable pass-through with brush strip	AR8429	Assists with containing air in the enclosure.	
Cable containment brackets	AR7710	Contains cables along the rear cable channel (AR7501) and is installed without tools.	
Side panel with access holes	AR7305	Side panels that allow pass through to adjacent enclosures. Holes contain brushes to control the airflow. Replaces upper side panel only.	

Product	SKU	Description	Figure
Zero-U accessory mounting bracket	AR7711	The bracket can be mounted in various locations throughout the enclosure for supporting small accessories and equipment.	
Cable tree	AR7505	Routes cables or attaches PDUs vertically in the rear of the enclosure. Consists of three pieces, including a smaller piece that allows it to be installed in a 48-U enclosure.	
Roof bridge	AR7209	Replaces the standard roof to allow increased cabling access while still supporting InfraStruXure troughs and partitions. Consists of two pieces of equal size.	
Vertical Cable Organizer for NetShelter 0-U Channel	AR8442	Eliminates cable stress by organizing cable layout within the rear cable channels (AR7501) of the enclosure. Takes up zero U of space within the enclosure. Consists of two pieces of equal size that, when connected, span the height of a 42-U enclosure. Can be used in any APC enclosure.	

Joining Enclosures

Joining the Enclosures

You can expand your installation by joining two enclosures together. All enclosures include pre-installed joining hardware.

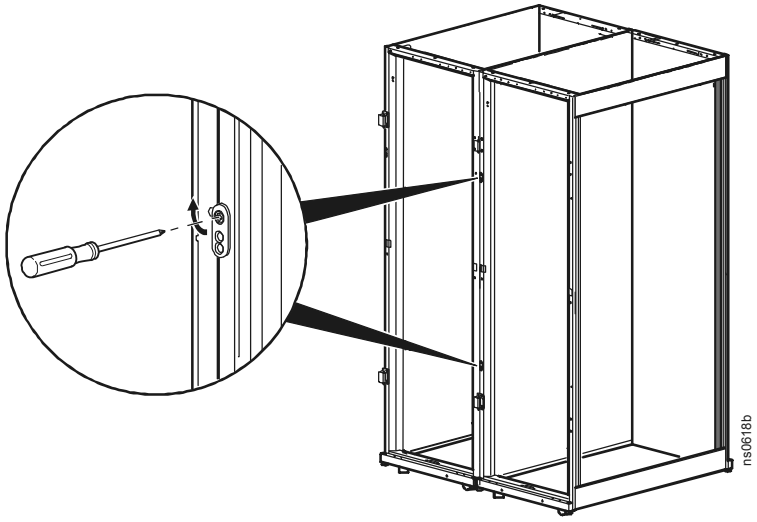
Caution: Joining enclosures together does not provide additional stability to the enclosures.

Note: NetShelter VL enclosures can be joined with or without side panels installed.

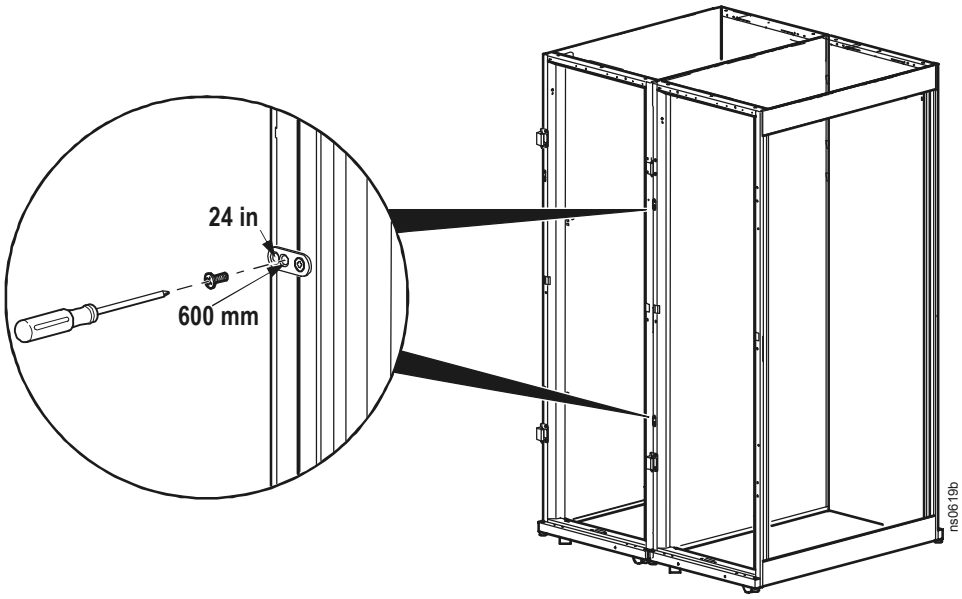
1. Remove the front doors from the enclosures if necessary.

   See “Removing the doors” on page 13.

2. Locate the four joining brackets on the enclosure—two brackets on the front and two brackets on the rear. Rotate each bracket ninety degrees toward the adjoining enclosure, so that the brackets are parallel to the floor.



3. The enclosures can be joined so that their centers are 24 in or 600 mm apart. Align the enclosures to use the appropriate holes on the front and rear of the enclosures and secure the enclosures using one M5 x 12 flat-head screw per bracket.



4. If enclosures are joined together on 24-in centers, there is a gap between them. APC offers optional baying trim (AR7600) to cover the gap between the enclosures. The trim snaps into place without tools and can be installed after the units are joined together and have equipment installed in them.

Note: The 600-mm enclosures join together without a gap when joined using the inner-most set of holes on the joining brackets.

5. Reconnect the grounding wires, and reinstall the doors, if needed.

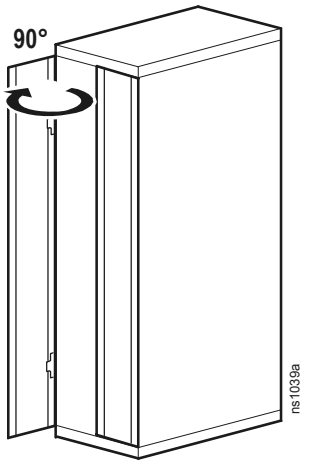
See “Installing the doors” on page 13.

To connect a NetShelter VL enclosure to a NetShelter SX, VX, or VL enclosure, APC offers a separate joining kit (AR7601 for enclosures with 600-mm centers or AR7602 for enclosures with 24-in centers). When using the joining kit, the NetShelter VL enclosure will be inset by 33.2 mm (1.3 in) from the NetShelter SX, VX, or VS enclosure.

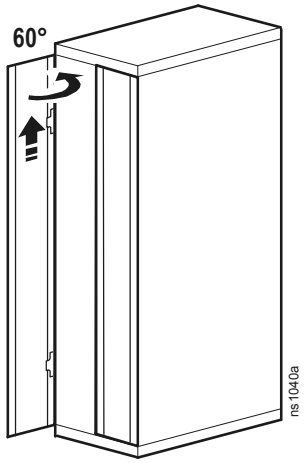
Removing the Doors of Joined Enclosures

If enclosures are joined together, the door removal process is slightly different than on a single enclosure. Follow these steps to remove either a front or rear door from an enclosure that is joined to another enclosure.

1. Open the door you wish to remove to a 90 degree angle. The door will not open farther than this because of the enclosure next to it.
2. Lift the door upward.



3. As you lift the door, turn it back to 60 degrees from the rack and lift the door off of its hinges to remove it.



Specifications

600-mm, 42-U Enclosures

	Measurements	
Item	**AR2900**	**AR2901**
Net height	1970 mm (77.56 in)	1970 mm (77.56 in)
Net width	600 mm (23.62 in)	600 mm (23.62 in)
Net depth	1070 mm (42.13 in)	1070 mm (42.13 in)
Net weight	105.62 kg (232.85 lb)	76.16 kg (167.90 lb)
Total open area (front door)	593 018 mm^2 (919.18 in^2)	593 018 mm^2 (919.18 in^2)
Total open area (rear door)	669 276 mm^2 (1,037.38 in^2)	669 276 mm^2 (1,037.38 in^2)
Open area per U (front door)	14 129 mm^2 (21.90 in^2)	14 129 mm^2 (21.90 in^2)
Open area per U (rear door)	15 935 mm^2 (24.70 in^2)	15 935 mm^2 (24.70 in^2)
Percent open (front door)	66%	66%
Percent open (rear door)	74%	74%
Clearance (for wiring between front door and vertical rail)	76.20 mm (3.00 in)	76.20 mm (3.00 in)
Weight rating (static load†)	1052 kg (2,315 lb)	1052 kg (2,315 lb)
Weight rating (rolling)	802 kg (1,765 lb)	802 kg (1,765 lb)
Weight rating (shipping‡)	567 kg (1,250 lb)	567 kg (1,250 lb)

† Lower the leveling feet if the static weight is over 1050 kg (2,314 lb).

‡ Additional packaging may be required if the rack is being reshipped with equipment installed. See the APC Web site, **www.apc.com,** for details.

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  - **www.apc.com** (Corporate Headquarters)
    Connect to localized APC Web sites for specific countries, each of which provides customer support information.
  - **www.apc.com/support/**
    Global support searching APC Knowledge Base and using e-support.
- Contact the APC Customer Support Center by telephone or e-mail.
  - Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

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